# Intelligent Transportation Systems: A Resource for Archived Traffic Data

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PENNDOT

Bureau of Planning & Research

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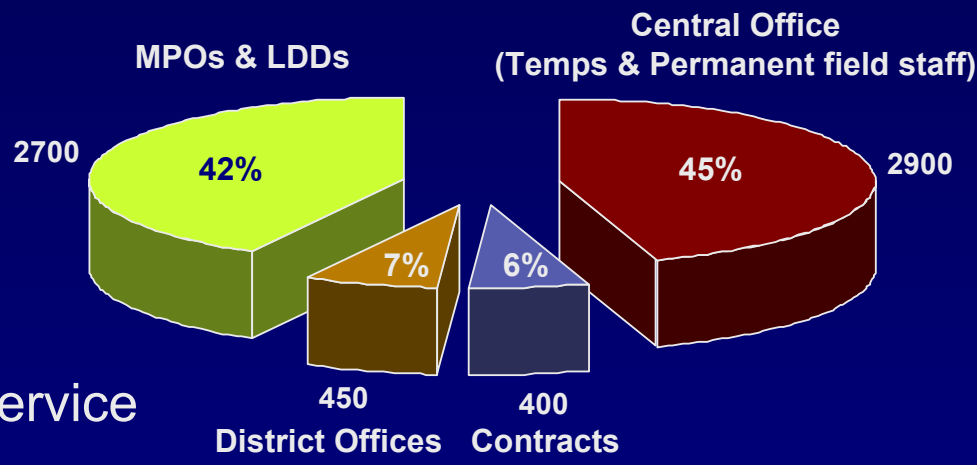
# Presentation Overview

- Pennsylvania Traffic Count Program
- ITS Initiatives
- Pittsburgh Experience
- Philadelphia Experience
- Conclusions
- Lessons Learned

# Traffic Data Collection

- Critical to All Core Businesses
  - Traffic engineering
  - Design
  - Maintenance
  - Planning and programming
  - Winter services, etc.
  - Internal and external customer service




- Expensive
  - Contracts
  - Metropolitan Planning Organizations & Local Development Districts
  - Temporary staff
  - PENNDOT permanent field staff
- Goal
  - Cost effective traffic counting program
  - Use existing sources whenever possible
  - Ensure safety

# Pennsylvania Traffic Counting Program

- Collect traffic data on 40,000 miles of PENNDOT owned roads and 3,200 miles of local federal aid roads
- Approximately 33,000 locations statewide
- 6,500 counts per year
- Volume, vehicle classification, weight, and speed data


# ITS Initiatives


- Transportation Planning staff recently visited all 11 PENNDOT Engineering District Offices.

- Identified ITS equipment capable of collecting archived data
  - Truck Rollover systems
  - Video detection
  - Signalized intersections
  - Roadway weather information systems
  - Microwave and Acoustic sensors

# Truck Rollover Systems

- System archives 13 classes of vehicles and average speed.
- Data provided to BPR in hardcopy.
- Currently evaluating data.

# Video Detection


- Volume and limited vehicle classification data
- Three districts planning to install systems

# Signalized Intersections

- Most signals owned by municipalities not PENNDOT.
- In-pavement loops used for signal timing also provide traffic volume and speed data.
  - Closed loop signal systems.
- Pilot project to analyze data from signalized intersections

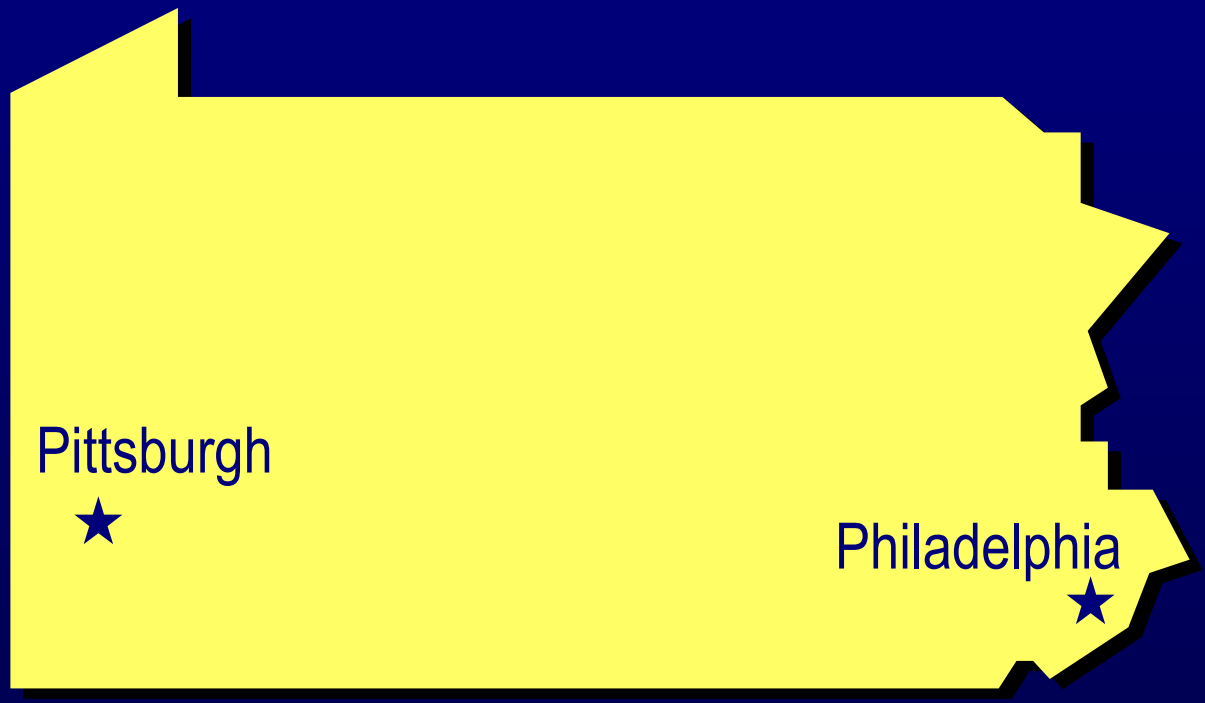
# Roadway Weather Information Systems

- Sensors collect traffic volume and average speed data.
- Initial evaluation of sensors proved data not useable
  - Sensor placed in wheel path or shoulder
  - Sensor only in one lane of traffic

- Re-evaluating sensors per District Engineer's recommendation.

# TEA-21 Legislation

- Mobility Technologies received a federal earmark to deploy an intelligent transportation infrastructure system in the two largest metropolitan areas in Pennsylvania.
- Transportation Planning seized the opportunity to partner with Mobility Technologies to supplement our traffic count data with ITS data.



# Data Collection

- Installation of 292 Remote Traffic Microwave Sensors in Pittsburgh and Philadelphia.
- Sensors placed on interstates and major arterials.
- Sensors collect volume, long-vehicle, lane occupancy and speed by lane.
- Disseminated to stakeholders via website application.

# Transportation Planning's Role

- Worked with Mobility Technologies to get the data into FHWA TMG standardized format.
  - Compatible with PENNDOT's Traffic Editing Program
- Participated in site selection for Philadelphia
- Data Analysis
  - Close working relationship with Mobility Technologies and FHWA.

# Pittsburgh Project

- System was officially launched September 2000.

# Pittsburgh Project

- Approximately 114 microwave sensors installed along 140 miles of road.

# Pittsburgh ITS Summary

- Evaluation is still ongoing.
  - Daily volumes are reasonable compared to daily volumes in PENNDOT's Roadway Management System (RMS).
  - Hourly volumes of sensor compared to ATR are improving.
  - Sensor placement is a key factor in data quality.

# Data Evaluation - Pittsburgh

- Field Tests
- Automatic Traffic Recorder (ATR) comparisons
- Daily Sensor Volumes
  - Compare to historical data in Roadway Management System
  - Monthly variations

# Pittsburgh Initial Field Test

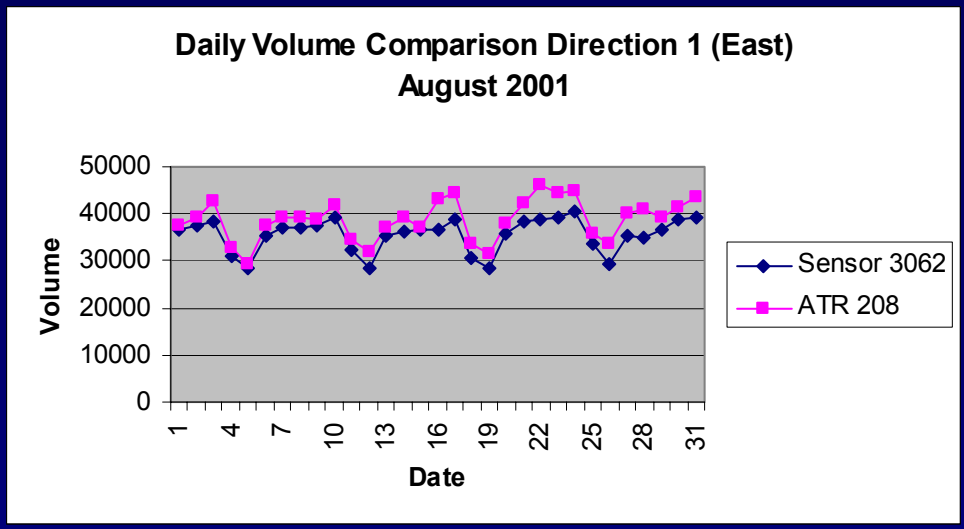
- Manual counts taken at 5 locations for 2-3 hours.
  - Hourly volumes varied less than +/-10% for manual counts at 4 of the 5 sensor locations.
- Loop detection
  - Hourly volumes
    - Hourly volumes (EB) varied more than +/-10% for ~60% of the hours.
    - Hourly volumes (WB) varied more than +/-10% for ~20% of the hours.

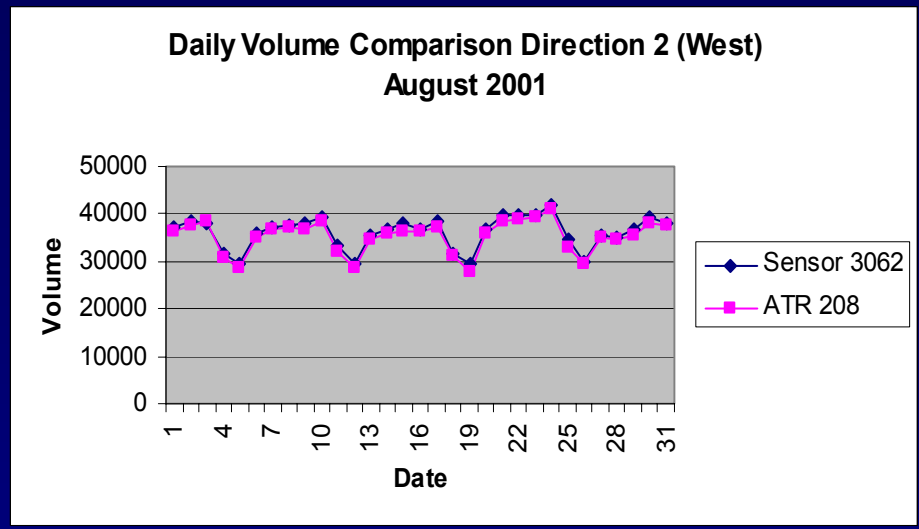
# Pittsburgh ATR Comparisons

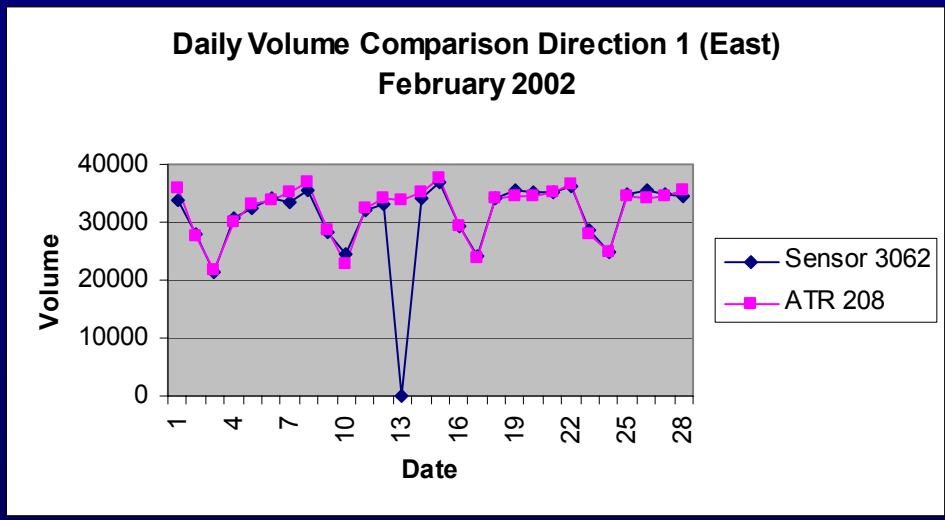
- June, July and August 2001
  - Hourly volumes
    - Hourly volumes (EB) affected by sensor locked on barrier.
    - Hourly volumes (WB) high during early morning and late evening hours.
  - Daily volumes for westbound direction within acceptable range of variation from ATR.

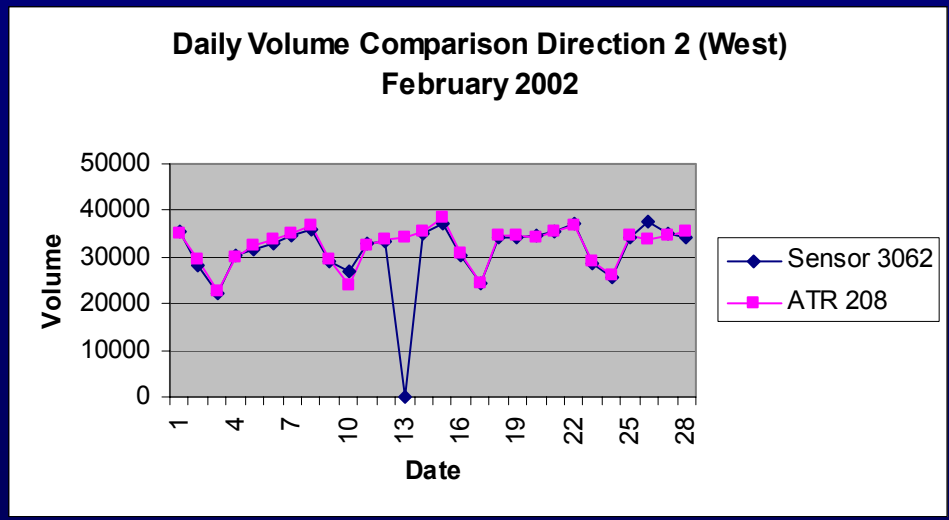
- October 2001 and February 2002
  - Hourly volumes – data improving
    - Hourly volumes (EB) varied more than +/-10% for ~30% of the hours.
    - Hourly volumes (WB) varied more than +/-10% for ~10% of the hours.
    - Greatest variation in hourly data occurred during late evening and early morning hours
  - Daily volumes within acceptable range of variation from ATR.

# Pittsburgh ATR Comparisons



# Pittsburgh Daily Sensor Volumes

- Historical Data
  - Daily sensor volumes for the month are compared to current and historical data in our Roadway Management System.
- Evaluate daily sensor volumes for the entire month
  - Use monthly reports generated from Traffic Editing Program

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Northbound

| Week of | Sun | Mon | Tue | Wed | Thu | Fri | Sat | TOT |
|---|---|---|---|---|---|---|---|---|
| 02/01 | | | | | | 21739 | 22647 | 44386 |
| 02/03 | 16602 | 26693 | 29451 | 30139 | 30995 | 31802 | 9892 | 175574 |
| 02/10 | 14648 | 28905 | 30389 | 0 | 30868 | 31806 | 23721 | 160337 |
| 02/17 | 17131 | 27354 | 31020 | 30646 | 30924 | 31601 | 23696 | 192372 |
| 02/24 | 8290 | 26173 | 30718 | 30965 | 28952 | | | 125098 |
| TOTAL | | | | | | | | 697767 |
| AVERAGE | 14168 | 27281 | 30395 | 22938 | 30435 | 29237 | 19989 | 24920 |

49%

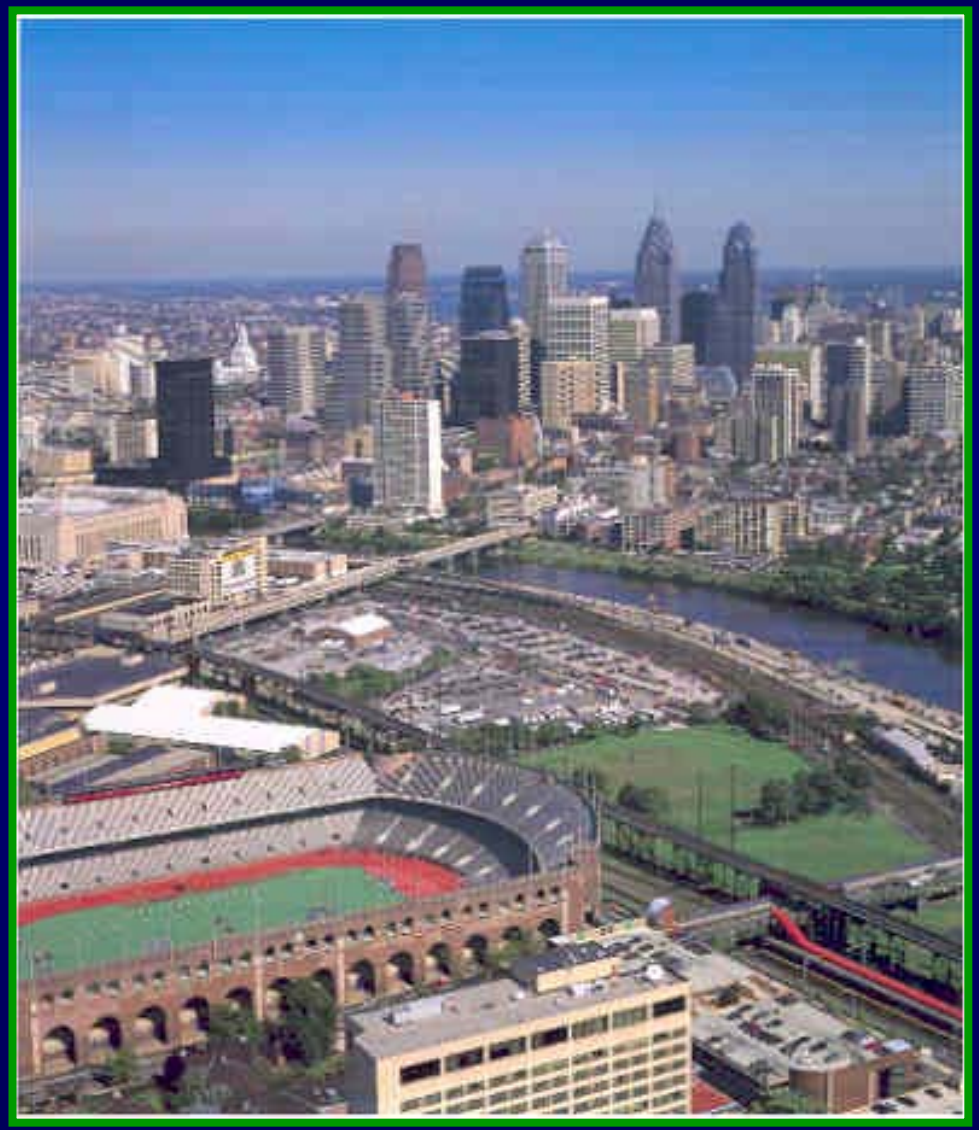
Southbound

| Week of | Sun | Mon | Tue | Wed | Thu | Fri | Sat | TOT |
|---|---|---|---|---|---|---|---|---|
| 02/01 | | | | | | 17879 | 24538 | 42417 |
| 02/03 | 17142 | 28452 | 31307 | 31978 | 32694 | 33539 | 11936 | 187048 |
| 02/10 | 15567 | 30456 | 32072 | 0 | 33101 | 33938 | 25373 | 170507 |
| 02/17 | 17867 | 29603 | 32427 | 32374 | 33089 | 34047 | 25604 | 205011 |
| 02/24 | 9461 | 24766 | 32053 | 32356 | 30518 | | | 129154 |
| TOTAL | | | | | | | | 734137 |
| AVERAGE | 15009 | 28319 | 31965 | 24177 | 32351 | 29851 | 21863 | 26219 |

51%

# Philadelphia Project

- System was officially launched in June 2001.

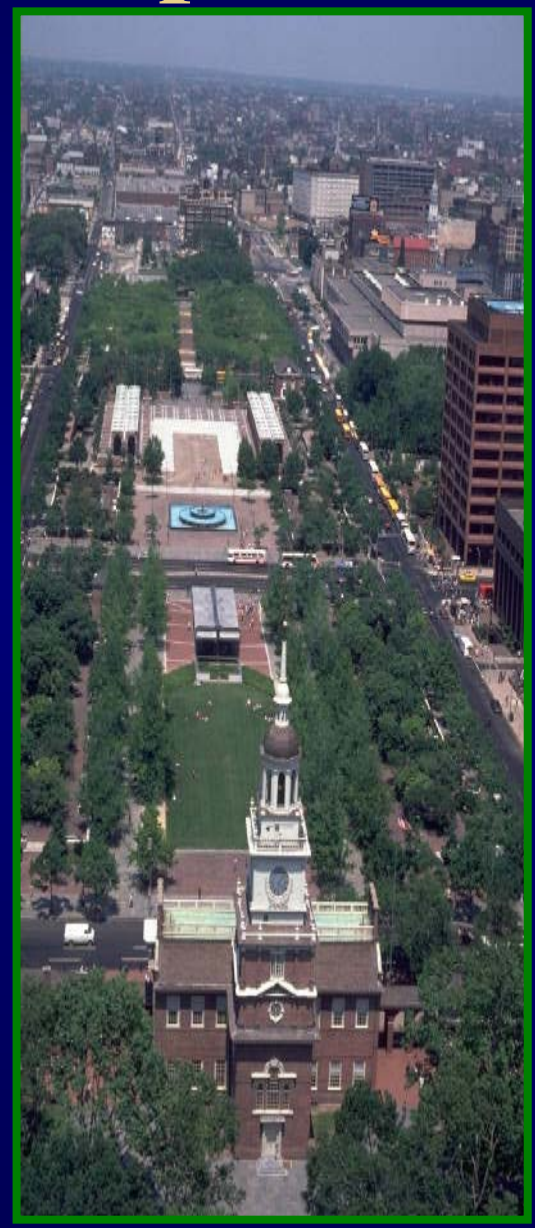


# Philadelphia Project

- Approximately 178 microwave sensors installed along 135 miles of road.

# Data Evaluation - Philadelphia

- Field tests
- Automatic Traffic Recorder (ATR) Comparisons
- Daily Sensor Volumes
- Construction projects are affecting sensor analysis



# Conclusions

- Daily volumes appear reasonable. Incorporation of daily volume data into RMS is pending further analysis of hourly data.
- Hourly volumes (sensor versus ATR) are improving for Pittsburgh.
- More analysis needed for Philadelphia ATR and sensor comparisons.
- Additional testing (manual counts, loop detection systems, etc) is planned to compare hourly volumes from sensors in both metropolitan areas.

# Lessons Learned

- Communication is a vital component to the evaluation process.
- Coordinate ITS projects early in the planning process.
- Standardized traffic data format.
- Automated Data Analysis and Processing
  - Upgrading Traffic Editing Program to accept all types of counts and apply factors.
- Sensor location is a key factor in determining data quality.
- ITS is a viable source of traffic data and worthy of continued research and analysis.

# Questions?

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